

A Framework for Designing Enhanced Learning Activities in Web2.0-Based Personal Learning Environments

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Abstract: Deploying web-based Personal Learning Environments, PLEs, in educational settings is becoming a main trend in technology enhanced learning. By combining the main elements of the student's control and the components of technology-based teaching process, a framework for designing enhanced learning activities is proposed. The proposed framework assists teachers to design appropriate learning tasks to be done by students to support their learning process through developing PLEs by making use of relevant web tools. The framework promotes a learning-by-doing approach which can improve digital competencies of students and allows teachers to acquire deep understanding and situated knowledge about content, technology, teaching and learning processes.

Introduction

In recent years, the emergence of new web technologies as well as the abundance of learning content gave birth to the Personal Learning Environment concept. In a nutshell, a PLE is learner-centered learning environment developed by students that encompasses every tool, service, content, and person involved in the digital part of learning process (Casquero et al., 2010). Taking 21ST century learning requirements into consideration, many authors argue that PLEs can radically reconceptualize the notion of learning by affording students more control, accessibility, openness, and connectedness within their learning environment (Attwell 2007, McLoughlin, Chatti et al., 2010). New perspectives for PLEs describe them as an approach for the management of the learning process by means of technology from a personal point of view. In the light of these perspectives, engagement with technology is conceived as a fundamental need for students to be able to address their present and future learning requirements and PLE is seen as “a practical intervention concerning the organization of technology in education” (Johnson & Liber, 2008).

The use of web 2.0 tools and social software is a common approach to developing web2.0-based PLEs. These tools provide much potential to support the learning activities of students (Conole, 2008, McLoughlin, 2010). They use these tools to support seeking, assessing and handling of information, and communication. In addition, students employ these tools to create and maintain supportive networks, to discover employment opportunities, to explore different forms of identity presentation, to generate social capital, and to facilitate psychological development by maintain close communication with friends (Conole, 2008).

Taking the learning potential of web 2.0 tools into consideration, the question of how to construct web2.0-based PLEs in educational settings to address the heterogonous learning requirements of students is posed. Indeed, a problem with designing and developing of web2.0-based PLEs has been that, while there is a large and increasing number of suitable web2.0 tools, a theoretical-based technological-pedagogical framework as well as practical advice on how to construct web2.0-based PLEs is unavailable. Affected by this theoretical-practical gap, educators

at different educational levels are forced to adapt and rethink their teaching approaches in conjunction with the advent of new web technologies “without a clear road map for attending to students’ various needs” (Kop, 2008).

It is noteworthy that, although, the PLE concept has arisen due to innovations in web2.0 technologies, the development of web2.0-based PLEs should be regarded as student-centric and pedagogic, rather than as a technology-driven issue. Indeed, neither a superficial combination of web2.0 tools to construct PLEs nor assuming that PLE is merely a software tool cannot make a significant difference to the students’ control over their learning nor can it equip them with the appropriate digital skills and competencies (Rahimi et al., 2012). By contrast, a pedagogy-driven approach to PLE explains the development of PLE as an extensive effort to manage learning environment through the acquisition of technological habits with learners (Johnson & Liber, 2008). In the light of this perspective, the development of PLE should be assumed as a process which students initiate, manage and direct in order to design and build a technology-appropriated personal learning environment as a tool to support learning and achieving control over their learning process. As a result, the active involvement of students in this process can equip them with the appropriate digital skills and competencies required to support their learning process (Drexler, 2010).

Developing PLEs by using web2.0 tools in formal educational settings places several challenges in the front of both teachers and students. These challenges pose the development of PLE beyond the scope of conventional technology integration approaches. Most of the technology integration approaches follow a top-down, teacher-driven approach to incorporate a tool in the learning environment in order to improve specific aspects of educational process. By contrast, the complexity of PLE development in educational settings is laid in its approach to empower students and the way that technology should be incorporated into the teaching and learning processes to support this empowerment. In other words, teachers need to rethink and adapt their pedagogical approaches to provide more opportunity for students to achieve and practice control by means of PLE building. At the same time, students should be more active in personal and social aspects of their learning process to gain appropriate competencies required to negotiate and keep this control.

Students’ Control as the Core Element Of PLEs

Despite increasing attention toward the PLE concept in e-Learning domain, there is not a unique interpretation about it. Whereas it has been regarded by many authors from a technological perspective, some argue that it should be treated as a learning philosophy and personal development approach instead of merely some web tools (Johnson & Liber, 2008). It seems that the existence of the different interpretations of terms personalization and personal are the main sources for this lack of consensus. There are two distinct approaches regarding these terms. On this basis, according to Johnson and Liber (2008), while “personalization” refers to the desire to create learner-centered and provider-driven model of education, “personal” refers to a fundamentally learner-driven model of education facilitated by recent rise in personal technology. Obviously, taking each of these approaches can result in different definitions and development mechanisms for PLE.

In spite the different interpretations about the PLE concept, it seems that there is consensus between authors about the students’ control as the cornerstone of the PLE. On this basis, as stated by Downes (2006), the main idea of PLE is migration of control from institution to learner. Also, Attwell (2007) argued that placing the control of learning on the hands of learner and supporting them with skills and competencies to make them able to find their own ways is central to the PLE-based learning. Interestingly, the emphasis of PLE on the students’ control is in line with the ideal aim of education which stated by Dewey in 1938 as the “creation of power of self-control” (Cited in Dron (2007, p.45)). Considering the learner control as the core element of the PLEs has several theoretical and practical implications for developing PLEs in educational settings. Firstly, it poses the PLE development as a pedagogy-driven process, instead of a technological tool, which can prevent superficial technology integration into educational settings. Secondly, it underscores the importance of the active participation of students in the educational process and emphasizes an activity-based, process-oriented, and student-centric learning environment as the appropriate context for the PLE-based learning. Thirdly, by giving more control to students, it is more likely that they start to pursue and enrich their learning experience by initiating and getting involved in several learning activities by using different web2.0 tools. As a result, it reveals the ways that students employ technology to manage their learning and affords teachers a rich context to acquire deep understanding and knowledge about technological, content, and social aspects of PLE-based learning process. Consequently, it provides an opportunity that control being negotiated and shared collaboratively between teacher and students.

Supporting the students' control in the PLE-based learning is a complex process which requires developing a framework that defines active roles for both teacher and students to address the following requirements:

- Developing students' digital competencies
- Improving teacher's knowledge about teaching with technology
- Providing a pedagogy-driven strategy for integrating technology into the educational setting

Fig. 1 depicts the proposed framework. The framework takes into consideration the dimensions of students' control and the elements of teaching process. Because a model to support students' control in PLEs is unavailable, we adopted the control dimensions model proposed by Garrison and Baynton (1987) to develop a student's control model in web2.0-based PLEs. Furthermore, to involve the main aspects of the technology-based teaching process in the framework, we used the TPACK framework proposed by Mishra and Koehler (2006) to define the sorts of knowledge that teachers need to now in order to be able to teach with technology.

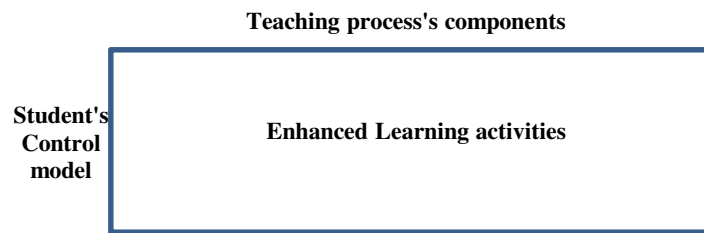


Figure 1: A conceptual model to design enhanced learning activities to develop Web2.0-based PLEs

TPACK Model

Teaching with technology, in particular web2.0 tools, is not a straightforward and simple task for teachers. Affected by the rapid advent of new technologies, they need to do more than simply learn available web tools, rather than they have to learn new skills and knowledge to deal with these rapid changes. In order to define the sorts of knowledge and skills that teachers require to implement technology based educational practices, Mishra and Koehler (2006) presented a technological pedagogical and content knowledge (TPACK) model, as shown in Fig. 2.

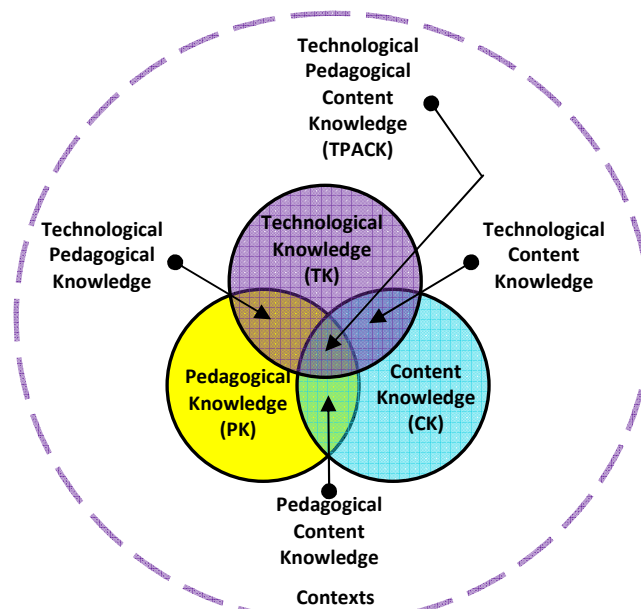


Figure 2: The TPACK model (Mishra & Koehler, 2006)

TPACK model is based on the assumption that teaching with technology is a highly complex activity, which merely introducing technology to teachers and educational process is not enough to support it; rather than, it draws on many kinds of skills and knowledge, include: (i) Content Knowledge (CK), (ii) Pedagogical Knowledge (PK), (iii) Technological Knowledge (TK), (iv) Pedagogical Content Knowledge (PCK), is knowledge about how a particular content should be taught in order to be comprehensible for others, (v) Technological Content Knowledge (TCK), shows the interplay between content knowledge and technological knowledge and refers to knowledge about the possibilities and constraints of different technologies to represent content, (vi) Technological Pedagogical Knowledge (TPK), is knowledge of affordances of different types of technologies to support teaching practices, as well as knowing how teaching process can be affected by particular technologies, and (vii) Technological Pedagogical Content Knowledge (TPACK), shows the interplay between content, pedagogical, and technological knowledge (Mishra & Koehler, 2006).

The Proposed Model for Student's Control in the Web2.0-Based PLEs

While the concept of student's control appears to be an essential and defensible aim of PLEs, there is little consensus regarding what this concept means and how students can attain control over their web2.0-based PLEs. In order to develop a model to support students' control in the web2.0-based PLEs, we adopted the control dimensions model proposed by Garrison and Baynton (1987) for distance education. This model consists of three dimensions, include: Power, Support, and Independence. According to Garrison and Baynton (1987), *Power* is the abilities and competencies that the learner needs to achieve control over the learning process. Abilities such as study skills, digital literacies, instrumental knowledge, group working skills, intellectual abilities, learning techniques, creating personal meaning, and self-reflection are perquisite for achieving control over learning process. *Support* refers to the resources, structure, guides, and scaffoldings that the learner needs to carry out the learning process and keep control over it. *Independence* is concerned with goals setting, selecting learning paths and having a certain degree of freedom to choose what, how, when, and where to learn. In other words, it emphasizes the provision of appropriate opportunity for students to practice control over their learning. The control dimensions model states that control is not achieved simply by providing independence. Instead, it can be achieved only by dynamic balance between independence, power and support in the learning process through the process of communication between teacher and students (Garrison & Baynton, 1987).

Fig. 3 depicts the proposed model for supporting student's control over web2.0-based PLEs. In order to embodying the activity-based and student-centric nature of PLEs, the model translates power, support, and independence dimensions into the active roles that a student should adopt to develop their PLE, namely knowledge producer, socializer, and decision maker, respectively. The knowledge producer role refers to the active involvement of the student in the process of learning content generating as a means to acquire relevant cognitive abilities. The socializer role pertains to the engagement of the student in social activities to practice and learn how to seek and achieve relevant support from others in a reciprocal way. The decision maker role relates to the decisions taken independently by the student regarding their learning process. The model is based upon this assumption that a learner can achieve, keep and practice control over their learning if s/he participates, actively in the educational process (i) by acquiring relevant knowledge, skills, and competencies, (ii) through participating in social activities to learn how receive/give relevant support from/to others, and (iii) by making decisions regarding to their learning process. The model explains how adopting these roles together can assist the student to improve control over their learning. It also explains the interplay between these roles and considers the PLE as an output, not input, of the learning process which underscores the constructivist-based approach of the model.

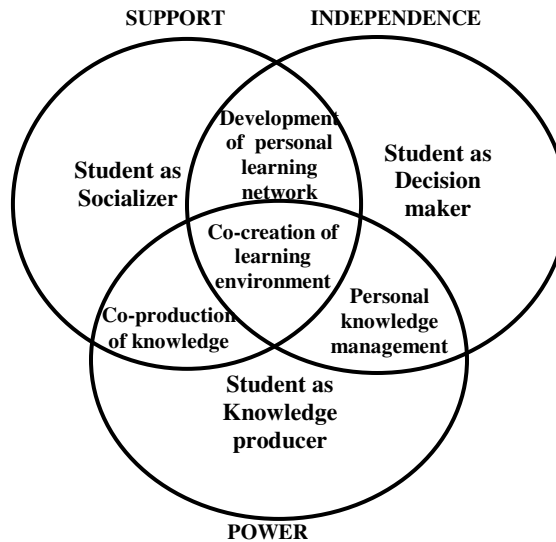


Figure 1: The proposed model for supporting student's control over web2.0-based PLE

Designing Enhanced Learning Activities for Developing Web2.0-based PLEs

Tab. 1 illustrates how the proposed framework, Fig. 1, can be used to combine the elements of the student's control model and teaching process to design appropriate technology-based learning activities. In Tab.1 for identifying the influential elements of the teaching process, the basic components of the TPACK model, namely content, technology, and pedagogy are selected and then the pedagogy component is divided into social aspect and process components. Taking the student's control model into account, there are three categories of learning activities associated with the three roles of students. By combining these three categories of learning activities with the four elements of the teaching process there will be twelve types of learning activities as below:

a) **Activities to support the student's role as knowledge producer**, include (i) *Learning subject matter knowledge*, which focuses on the cognitive activities associated with learning subject matter knowledge such as: understanding relevant facts, concepts, theories, and procedures; recognizing bias in online content; evaluating the quality and accuracy of content; aggregating, tagging and organizing content; appropriating, remixing and producing new content, (ii) *Learning instrumental knowledge*, i.e. doing effective search by different search engines; finding and using multiple information sources to support an argument; utilizing several format of information, (iii) *Learning social knowledge*, i.e. acquiring web-based group working norms and skills; locating relevant people and experts outside of the classroom context, and (iv) *Learning procedural knowledge*, refers to acquiring metacognitive knowledge and skills; recognizing type of information required to support a project or learning process; organizing relevant information for a learning project; documenting project details; presenting project results or learning outcomes.

b) **Activities to support the student's role as socializer**, include (i) *Requesting, receiving, giving content support*, i.e. providing, sharing, exchanging and co-producing content and learning material, giving and receiving feedback and comments, communicating around content, (ii) *Requesting, receiving, giving social support*, i.e. being aware of and observing other students' learning experiences and activities, exchanging relevant feedback and comments, group working, peer-based learning, (iii) *Requesting, receiving, giving technological support*, i.e. exchanging information and experiences about the learning affordances of web tools, and (iv) *Requesting, receiving, giving procedural support*, i.e. job sharing, dealing with group working challenges, co-evaluating the learning process and progress, peer assessing.

c) **Activities to support the student's role as decision maker**, include (i) *Developing personal knowledge management strategy*, i.e. accessing information from different sources and formats; creating personal presentation of content; mashing up, tagging and filtering incoming information, (ii) *Developing personal learning network (PLN)*, i.e. finding, introducing, and joining relevant communities; introducing and recommending relevant tools or content to others; publishing created knowledge, artifact, (iii) *Developing personal technological strategy*, i.e. creating a personal set of appropriated tools to support learning process by mashing up tools and services; evaluating the learning benefits of the selected web tools; personalizing and customizing tools; reflecting on tools

influence on learning; developing a personal technology selection and adaptation strategy, and (ix) *Developing personal learning management strategy*, i.e. selecting personal learning goals, reflecting on learning process, reflecting on own digital skills, planning and appraising learning project.

Teaching Process Control Model	CONTENT	SOCIAL ASPECTS	TECHNOLOGY	PROCESS
Knowledge Producer	Learning Subject matter knowledge	Learning Social knowledge	Learning Instrumental knowledge	Learning procedural knowledge
Socializer	Requesting, receiving, giving content support	Requesting, receiving, giving social support	Requesting, receiving, giving technological support	Requesting, receiving, giving procedural support
Decision Maker	Developing personal knowledge management strategy	Developing personal learning network	Developing personal technology management strategy	Developing personal learning management strategy

Table 1: The categories of enhanced learning activities

The first category of learning activities supports the knowledge producer role of students by assisting them to get more power to achieve control over their learning process. This power embodies in the form of subject matter, instrumental, social and metacognitive knowledge and skills. The second category of learning activities support the socializer role of students and allow them to keep their control by providing appropriate structure and guides through social activities. Indeed, by accomplishing this type of learning activities it is likely that they will learn how to support each other during learning process by providing and sharing relevant content, exchanging their good practices regarding technology use for learning purposes, giving feedback and comments to their peers, and participating in the co-construction of knowledge and co-developing of learning projects. The third category of learning activities support the decision maker role of students through encouraging them to practice control and assume responsibility over their learning by developing personal strategies for the different aspects of their learning process. Accordingly, students are stimulated to behave autonomously, by defining their personal strategy for knowledge and technology management, developing and extending their personal learning network, and managing their learning process. On this basis, it is noteworthy that a student in order to be in control of their learning should be able to make autonomous choices about what s/he needs to learn and how to do so and to move from a state of dependence to one of independence by making and evaluating their own choices regarding their learning trajectory (Dron, 2007).

Taking the dimensions of teaching process in Tab. 1 into consideration, the framework assists educators in designing relevant learning tasks and then in selecting appropriate web tools to implement these tasks by students. In this regard, the *content* dimension suggests that the educator should teach students how to find, understand, apply, evaluate, and create relevant subject matter content by means of technology and other people's support. Furthermore, the teaching process should provide a supportive structure for assisting students to co-construct knowledge and to prompt them to develop a personal strategy for information and knowledge management. From the social aspect perspective, teaching process should provide students with appropriate and sufficient technology-based group working knowledge and skills. Also, it should try to enrich the social asset of students by highlighting the importance of peers and other people as the valuable sources for knowledge acquiring and learning and by promoting students to developing their own personal learning network. Taking the technological dimension into consideration, the teaching process should try to improve the instrumental knowledge of students. Also, it should provide opportunity for students to create and use their own set of web tools to support their learning activities and to share their technological knowledge and experiences with other students and their teachers. From a TPACK perspective, providing this opportunity for students, arguably, helps teachers to learn technological knowledge from their students. In addition, it reveals the ways that students are using technology which, in principle, can help teachers to design more student-centric technology-based learning environments. Finally, from the process point of

view, the teaching process should train and allow students to manage their learning process, set their learning goals, co-develop learning project, and evaluate and monitor their learning progress.

Discussion

The framework can affect the educational process in three domains including: developing students' digital competencies, improving the teacher's TPACK model of knowledge, and providing a pedagogy-driven strategy for integrating technology into the educational setting.

1. Developing students' digital competencies: New approaches for PLE building highlight the importance of acquiring appropriate digital competencies and technological habits by students to enable them to manage their own learning process (Johnson & Liber, 2008, Pena-Lopez, 2012). Tab. 2 shows how this framework can develop students' digital competencies in three levels illustrated as below:

Level I: Developing the information and Internet literacy of students: Catts and Lau (2008) suggested that there are five main elements that indicate information and Internet literacy, include: (i) Recognizing information needs, (ii) Locating and evaluating the quality of information, (iii) Storing and retrieving information, (iv) Making effective and ethical use of information, and (v) Applying information to create and communicate knowledge. Arguably, accomplishing the first category of learning activities can result in the development of information literacy and Internet skills of students.

Level II: Developing the social and Emotional literacy of student: According to Eshet (2004) and Ala-Mutka (2011), the social-emotional literacy includes skills and attitudes to benefit from communication and collaboration potential of web tools and resources, including: willingness and ability to co-construct and share knowledge, ability to give useful feedback to peers and receive feedback from them, teamwork skills, and finding and joining relevant communities. Obviously, the second category of learning activities can improve social-emotional literacy of students.

Level III: Developing the media literacy of students. Affected by increasingly spreading of web2.0 tools and social software, media literacy is becoming an important concept focuses on the skills and abilities that a person needs to act more independently in a digital era, such as the ability to access, evaluate and create content in different digital media; analyzing and evaluating media content; and reflecting media influence (Ala-Mutka, 2011). Arguably, the third category of learning activities which emphasize the provision of content, technological, social and procedural choices for students to make autonomous decisions during their learning process can improve students' medial literacy.

2. Improving the teacher's TPACK model of knowledge: In addition to the digital competencies of students, the framework can develop the TPACK knowledge model of teachers as shown in Tab. 2. Indeed, the development and adoption of web2.0-based PLE in the educational settings requires both teachers and students to teach and learn together. On this basis, the framework assumes two main roles for teachers during the development process of PLE include, (i) as designer to design appropriate technology-based learning tasks for guiding students how to learn with technology, and (ii) as learner to learn how to teach with technology. To support these complex roles, the framework follows the learning-technology-by-design approach (Mishra & Koehler, 2006) which emphasizes learning by doing and designing, rather than lecturing and traditional teaching process. Following this approach helps teachers as well as students to teach, learn and acquire appropriate knowledge by designing and developing conceptually coherent web2.0-based PLEs. Learning-by-design approach has grounded in situated cognition learning theory proposed by Brown et al. (1989) to highlight the role of activity and context in the learning process and to explain how content or what is learned is interconnected to learning activity or how the content is learned. In other words, the activity in which knowledge is developed and deployed is an integral part of what is learned. In the light of this theory, knowledge is "a product of the activity, content and culture in which it is developed and used" (Mishra & Koehler, 2006).

Armed with the principles of situated cognition learning theory, it can be argued that teaching and learning by designing and utilizing PLEs can afford teachers an authentic and rich context to acquire deep understanding and situated TPACK model of knowledge about technology, content, social aspects of teaching and learning processes by revealing the ways that students develop and deploy PLEs to manage their learning process. In recent years,

selecting the most appropriate technology for supporting teaching and learning activities becomes more and more complicated due to the growing heterogeneity of available web-based tools and resources (Väljataga et al., 2007). To support this aspect of teaching and learning process, the framework highlights the importance of the provision of choice and opportunity for students to develop their personal strategy for finding, selecting, using and introducing relevant web tools and resources to support their learning process. This approach arguably can open several learning opportunities for teachers and students. Firstly, it enforces teachers and students to acquire new skills in order to discover learning affordances of web tools and to integrate them in their educational process (Couros, 2010). Secondly, in order to deal with this growing heterogeneity, decision making is becoming an important learning process for teachers and students. Indeed, choosing what to learn, how to find right answer, whom to connect, and what community to join or leave are becoming prevalent practices in today's teaching and learning processes (Siemens, 2008). Thirdly, the features and functionalities of web 2.0 tools are considered to be in a state of perpetual beta (O'Reilly, 2005). On this basis, it can be argued that the permanent and extensive contact of students with web 2.0 technologies, even more than their teachers, and unceasing development of web2.0 technologies can position students as the pioneer explorers of the new functionalities of web 2.0 tools. As a result, it can change the expectations from the students and provide an opportunity for them to cater their teachers with relevant technological (TK) and technological content knowledge (TCK) and to act as co-designer or even consultant for designing web-based educational activities.

3. Providing a pedagogy-driven strategy for integrating technology into the educational setting: Unlike most technocratic technology integration approaches which assume technology has an independent integrity and merely learning its functionalities is enough to employ it in educational context (Mishra & Koehler, 2006); the framework supports a pedagogy-driven approach to the integration of technology into the educational setting. Consequently, it can improve the technology integration process within the educational setting by providing guidelines for selecting appropriate technologies and incorporating them into educational process, based on the posed educational needs.

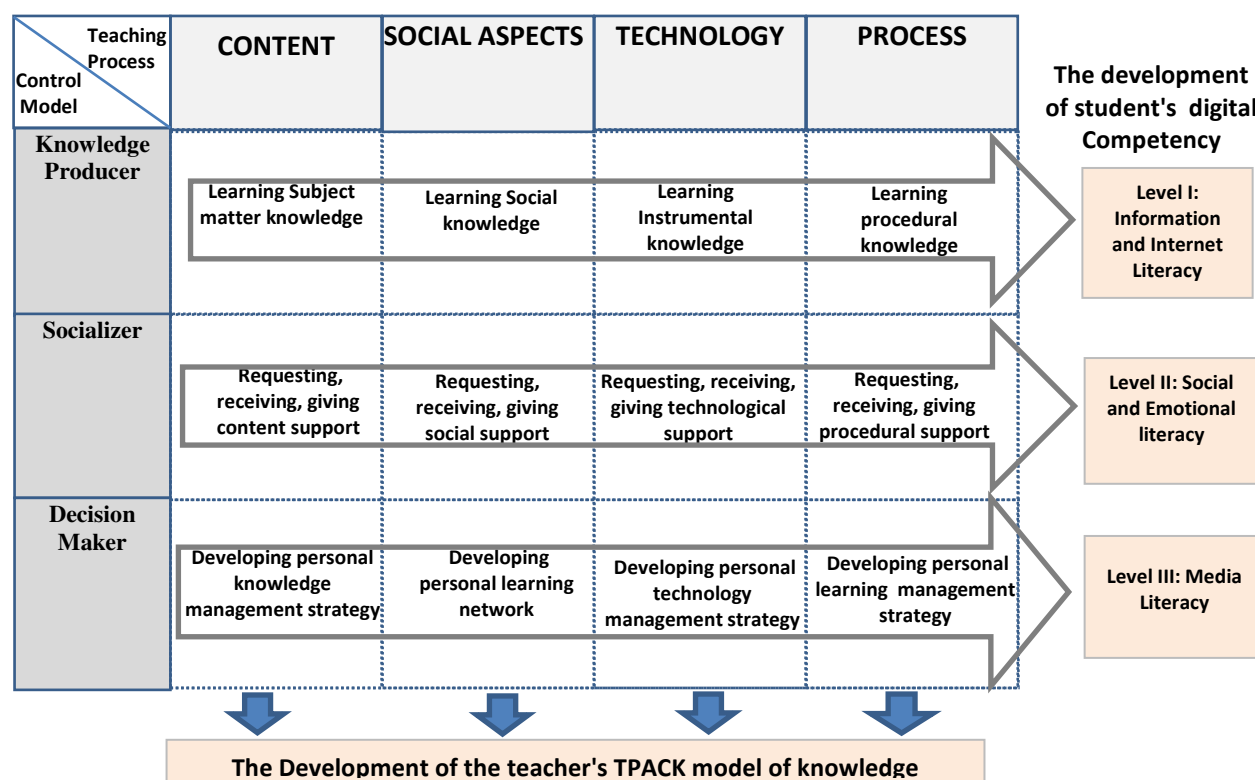


Table 2: Students and teachers development through the PLE building process

Conclusions

A framework for designing enhanced learning activities to build web2.0-based PLEs in formal educational settings has been proposed, especially by considering the influential dimensions of student's control in PLEs and technology-based teaching process. Equipping students with necessary digital competencies to deal with the challenges of our current knowledge intensive era and to achieve control over their learning, improving the TPACK knowledge of teachers, and providing a pedagogy-driven strategy to incorporate technology into educational process are the main objectives of this framework. Further research is supposed to be needed to test, evaluate and improve the framework introduced.

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